WHAT IS CLAIMED IS:

[c1] 1. A radio communication system comprising:

a transmitter 100 for generating a plurality of continuous noise transmitted waveforms separated by a time interval, D, transmitted data is encoded by a relative polarity of two instances of the plurality of continuous noise transmitted waveform wherein the transmitter 100 sequentially transmits a code word 135 comprising N_C chips, each of the N_C chips comprising a continuous noise transmitted waveform separated by a fixed time interval; and

a receiver 300 for receiving the plurality of continuous noise transmitted waveforms transmitted by the transmitter 300, the receiver 300 comprising:

a bank of correlators 320, each correlator 320 in the bank of correlators 320 being tuned to a different delay, each correlator 320 of the bank of correlators 320 comprising:

a multiplier 322 for multiplying delayed and undelayed versions of the received signal; and

an integrator 326 connected to the multiplier 322 for integrating an signal output by the multiplier 322;

a code word correlator 340 connected to the integrator 326 for correlating the code word 135 corresponding to the N_C chips.

[c2] 2. The radio communication system of Claim 1, wherein the code word correlator 340 comprises a digital signal processor (DSP) executing a code word correlator algorithm correlating the code word 135 corresponding to the N_C chips.

[c3] 3. The radio communication system of Claim 1, wherein the code word correlator 340 comprises a programmable logic device (PLD) executing a code

word correlator algorithm correlating the code word 135 corresponding to the N_C chips.

[c4] 4. The radio communication system of Claim 1, wherein the code word correlator 340 comprises an application specific integrated circuit (ASIC) executing a code word correlator algorithm correlating the code word 135 corresponding to the N_C chips.

[c5] 5. The radio communication system of Claim 1 wherein the receiver 300 further comprises:

an antenna 310 for receiving a received signal comprising the plurality of continuous noise transmitted waveforms transmitted by the transmitter 100;

a baseband demodulator 101 connected to the antenna 310 for converting the received signal into real and imaginary parts of a complex output, the baseband demodulator 101 comprising:

a delay 21a adapted to delay both the real and imaginary parts of the complex output;

a signal multiplier 22a connected to the delay 21a, the signal multiplier 22a being adapted to perform a complex multiplication of a direct path of the received signal by a complex conjugate of a delayed path of the received signal, and wherein the integrator 326 comprising two integrators 23a, 23b, one for the real part and another for the imaginary part of the product signal output by the signal multiplier 22a.

[c6] 6. The radio communication system of Claim 1 wherein the plurality of continuous noise transmitted waveforms being transmitted sequentially with a plurality of code words 135.

[c7] 7. The radio communication system of Claim 1 wherein the transmitter comprises:

a noise source for generating the plurality of continuous noise transmitted waveforms;

a delay connected to the noise source for delaying at least one of the plurality of continuous noise carriers by the time interval D;

an information modulator connected to the delay for modulating the code word into at least one of the plurality of continuous noise transmitted waveforms; and

a summer connected to the information modulator and the noise source for combining the two instances of the plurality of continuous noise transmitted waveforms wherein a first instance comprises an undelayed continuous noise transmitted waveform and the second instance comprises a delayed continuous noise transmitted waveform comprising the modulated code word.

[c8] 8. The radio communication system of Claim 7 wherein the transmitter 100 comprises a filter 175 connected to the noise source 110 for spectrally shaping the continuous noise transmitted waveform.

[c9] 9. The radio communication system of Claim 7 wherein the noise source 110 comprises a wideband noise source.

[c10] 10. The radio communication system of Claim 7 wherein the noise source 110 comprises a pseudo random noise source.

[c11] 11. The radio communication system of Claim 10 wherein the delay 160 is comprised in the pseudo random noise source and the continuous noise transmitted waveforms being delayed during generation by the pseudo random noise source.

[c12] 12. The radio communication system of Claim 1 wherein the delay time interval D can comprise more than a single delay, where multiple delays have nominal values spread around a nominal value of the transmitter's delay, a delay 160 actually used for demodulation being selected from among existing delays as that one

whose output has the highest energy in response to a transmission at the nominal delay.

[c13] 13. An ultra wideband communication system comprising:

a transmitter 100 for generating a plurality of continuous noise transmitted waveforms separated by a time interval, D, transmitted data is encoded by a relative polarity of two instances of the plurality of continuous noise transmitted wherein the transmitter 100 sequentially transmits a code word 135 comprising N_C chips, each of the N_C chips comprising a continuous noise transmitted waveform separated by a fixed time interval, the transmitter 100 comprising;

a wideband noise source 110 for generating the plurality of continuous noise transmitted waveforms;

a delay 160 connected to the noise source 110 for delaying at least one of the plurality of continuous noise carriers by the time interval D;

an information modulator 130 connected to the delay 160 for modulating the code word 135 into at least one of the plurality of continuous noise transmitted waveforms; and

a summer 170 connected to the information modulator 130 and the noise source 110 for combining the two instances of the plurality of continuous noise transmitted waveforms wherein a first instance comprises an undelayed continuous noise transmitted waveform and the second instance comprises a delayed continuous noise transmitted waveform comprising the modulated code word 135;

a receiver 300 for receiving the plurality of continuous noise transmitted waveforms transmitted by the transmitter 100, the receiver 300 comprising:

a bank of correlators 320, each correlator 320 in the bank of correlators 320 being tuned to a different delay, each correlator 320 of the bank of correlators 320 comprising;

a multiplier 322 for multiplying delayed and undelayed versions of the received signal; and

an integrator 326 connected to the multiplier 322 for integrating an signal output by the multiplier 322;

a code word correlator 340 connected to the integrator 326 for correlating the code word 135 corresponding to the N_C chips.

[c14] 14. The ultra wideband communication system of Claim 13 wherein the noise source 110 comprises a wideband noise source.

[c15] 15. The ultra wideband communication system of Claim 13 wherein the noise source 110 comprises a pseudo random noise source.

[c16] 16. The ultra wideband communication system of Claim 15 wherein the delay 160 is comprised in the pseudo random noise source and the continuous noise transmitted waveforms being delayed during generation by the pseudo random noise source.

[c17] 17. A method of communicating a continuous noise transmitted waveform, the method comprising the steps of:

generating a plurality of continuous noise transmitted waveforms;

delaying at least one of the continuous noise transmitted waveforms by a time interval, D;

modulating a code word into a delayed instance of at least one of the continuous noise transmitted waveforms wherein the code word comprises N_C chips, each of the N_C chips comprising a continuous noise transmitted waveform separated by a fixed time interval;

transmitting a sum of two instances of the plurality of continuous noise transmitted waveforms wherein a first instance comprises an undelayed continuous noise transmitted waveform and the second instance comprises the delayed instance of

the at least one of the continuous noise transmitted waveforms including the modulated code word;

receiving the sum of two instances of the plurality of continuous noise transmitted waveforms; and

correlating the code word corresponding to the N_C chips from the received sum of two instances of the plurality of continuous noise transmitted waveforms.

[c18] 18. The method of Claim 17 further comprising the steps of:

correlating the received sum of two instances of the plurality of continuous noise transmitted waveforms to a delay having time interval, D;

multiplying delayed and undelayed versions of the received sum of two instances of the plurality of continuous noise transmitted waveforms; and

integrating the multiplied delayed and undelayed versions of the received sum of two instances of the plurality of continuous noise transmitted waveforms.

[c19] 19. The method of Claim 17 further comprising the step of selecting the time interval D to correspond to a predetermined value.

[c20] 20. The method of Claim 17 further comprising the step of spectrally shaping the generated plurality of continuous noise transmitted waveforms.

[c21] 21. The method of Claim 17 wherein the generated plurality of continuous noise transmitted waveforms comprises wideband pseudo noise.

[c22] 22. The method of Claim 17 wherein the generated plurality of continuous noise transmitted waveforms comprises wideband noise.

[c23] 23. The method of Claim 17 wherein the step of correlating the code word is performed on a digital signal processor (DSP) executing a code word correlator algorithm, further comprising the step of performing analog-to-digital

conversions of the received sum of two instances of the plurality of continuous noise transmitted waveforms and providing digital inputs to the digital signal processor.

[c24] 24. The method of Claim 17 wherein the step of correlating the code word is performed on a programmable logic device executing a code word correlator algorithm.

[c25] 25. The method of Claim 17 wherein the step of correlating the code word is performed on a application specific integrated circuit (ASIC) executing a code word correlator algorithm.

[c26] 26. The method of Claim 17 wherein the step of receiving further comprises the steps of:

baseband demodulating a received signal to convert the received sum of two instances of the plurality of continuous noise transmitted waveforms to real and imaginary parts of a complex output;

delaying both the real and imaginary parts of the complex output;

performing a complex multiplication of a direct path by a complex conjugate of a delayed path; and

integrating the real part and the imaginary part of the product signal output produced by the step of performing the complex multiplication.

[c27] 27. The method of Claim 17 wherein the time interval D can be more than a single delay, where multiple delays have nominal values spread around a nominal value of the transmitter's delay, a delay actually used for demodulation being selected from among existing delays as that one whose output has the highest energy in response to a transmission at the nominal delay.

[c28] 28. A method of communicating a continuous noise transmitted waveform, the method comprising the steps of:

generating a plurality of continuous noise transmitted waveform using a wideband noise source;

delaying at least one of the continuous noise transmitted waveform by a time interval, D;

modulating a code word into a delayed instance of at least one of the continuous noise transmitted waveform wherein the code word comprises N_C chips, each of the N_C chips comprising a continuous noise transmitted waveform separated by a fixed time interval;

transmitting a sum of two instances of the plurality of continuous noise transmitted waveforms wherein a first instance comprises an undelayed continuous noise transmitted waveform and the second instance comprises the delayed instance of the at least one of the continuous noise transmitted waveforms including the modulated code word;

receiving the sum of two instances of the plurality of continuous noise transmitted waveforms;

correlating the received sum of two instances of the plurality of continuous noise transmitted waveforms to a delay having time interval, D;

multiplying delayed and undelayed versions of the received sum of two instances of the plurality of continuous noise transmitted waveforms;

integrating the multiplied delayed and undelayed versions of the received sum of two instances of the plurality of continuous noise transmitted waveforms; and

correlating the code word corresponding to the N_C chips from the received sum of two instances of the plurality of continuous noise transmitted waveforms.